



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 Sixth Avenue, Suite 900
Seattle, WA 98101-3140

MAR 21 2013

OFFICE OF
AIR, WASTE AND TOXICS

Ms. Susan Childs
Manager, Alaska Venture Support Integrator
Shell Exploration and Production
3601 C Street, Suite 1000
Anchorage, Alaska 99503

Re: Shell Gulf of Mexico, Inc., Noble Discoverer-Chukchi Sea, Application to Revise Permit to Construct No. R10OCS/PSD-AK-09-01

Dear Ms. Childs:

On February 13 and 19, 2013, the U.S. Environmental Protection Agency (EPA) received Shell Gulf of Mexico's (Shell) application for a revision to the Noble Discoverer Chukchi Sea Outer Continental Shelf/Prevention of Significant Deterioration Permit to Construct (No. R10OCS/PSD-AK-09-01). We have reviewed the application and determined that it is incomplete at this time. Additional information is needed to support the revisions Shell requested on February 13 and 19 in Items 6, 8, and 12-14. In addition, in an attachment, we provide contextual discussion for the BACT limits for nitrogen oxides (NO_x) applicable to the Discoverer main generator engines (units FD-1 – FD-6) and comments on Shell's proposal.

Information Request

February 13, 2012, Request - Item 6 proposes to revise Condition B.15.8 to remove the requirement to report deviations for measured carbon monoxide (CO) concentrations of 20 parts per million by volume (ppmv) or less. The request states "based on an analysis of 2012 source test data, exhaust concentrations less than 20 ppmv demonstrate compliance with the applicable CO limits for units subject to the requirement," and specifies FD-1 – FD-6 with a limit of 0.1790 grams per kilowatt-hour (g/kw-hr). Technical analysis adequately supporting this statement must be submitted before the EPA can evaluate this requested change to the permit.

February 13, 2012 Request - Items 12-14 propose to revise the best available control technology (BACT) determination for the hydraulic power unit and mud line cellar engines (emission units FD-9 – FD-13) and to revise the associated emission limits to reflect an undefined lower level of control – presumably uncontrolled. The submittal states "...the control technology for these units will not operate according to manufacturers recommendations because of inadequate exhaust temperature." The statements made in the February 13, 2013, submittal do not include sufficient basis to revise the BACT determination. Shell must submit technical analysis and other information as necessary to establish that operation of both the catalyzed diesel particulate filter (CDPF) and oxidation catalyst are technically infeasible for each of these engines for the EPA to evaluate the request.

February 13, 2012, Request - Item 8 proposes to revise the BACT limits for NO_x applicable to the Discoverer main generator engines (units FD-1 – FD-6) to an across-the-board limit of 3.7 g/kw-hr. In the February 13, 2013, submittal, Shell includes a list of six bullet points as justification for this proposed limit. We do not consider this list alone as providing sufficient technical justification for Shell's proposed limit.

February 19, 2013, Modeling File and Requests - The PDF containing the Appendix D write-up does not appear to have been updated. Shell should revise Appendix D and ensure that the emissions spreadsheet reflect the requested permit modifications.

NO_x BACT Limits and Potential Paths Forward for Limit Revision

As explained in Attachment 1, Shell has not provided sufficient technical basis for the proposed limit of 3.7 g/kw-hr. Additionally, Shell has provided no reasoning as to how operating scenarios expected to occur in the future, but not reflected in the 2012 data, could result in increased NO_x emissions. Given the overall uncertainty introduced by the fact that the 2012 data does not include all expected operating scenarios, the EPA's analysis assumes the potential for increased emissions due to deep drilling and includes an uncertainty factor given the limitations of the data.

There must be a reasonable technical basis to raise the revised NO_x BACT limits higher than EPA's current draft limits. Developing this basis is Shell's responsibility, and the company is in a better position to provide such a basis, but the EPA staff has identified two potential approaches which could help to answer the question of whether higher limits are justified. The EPA strongly recommends that should Shell decide to pursue these or other efforts to develop a technical basis for higher limits, Shell include the EPA technical staff early, often, and substantively to facilitate the permit revision process and to maximize the likelihood that the work meets regulatory requirements.

The first potential approach would be to establish that data excluded in the EPA analysis as representing control device malfunction is in fact not a malfunction, but proper operation of the EPOD. As the EPA engineer has explained to Shell's consultant, and as indicated in the draft EPA analysis, several portions of the data were removed as representing probable EPOD malfunction due to unexplained decreases in the urea injection rate. These portions of data represent higher emissions levels than were used to determine the EPA's draft limits for some engines. Establishing that these portions of the data represent proper operation of the control device and not malfunction would provide a basis to include them in the set of data representing proper operation, and result in somewhat higher proposed limits for certain engines. Any effort to establish the EPOD behavior observed during these time periods as proper operation must include an adequate technical explanation provided by the control device manufacturer.

The second potential approach would be to show that operating scenarios not represented in the 2012 data (such as deep drilling) are likely to result in higher emission rates than those measured during 2012. Specifically, Shell could identify other drill rigs whose generator sets (genset) are controlled by selective catalytic reduction (SCR) and experience the relevant operating scenarios. Emission data from a genset controlled by SCR collected during stable load, shallow drilling (variable load), and deep drilling could shed light on whether the deep drilling scenario is likely to result in increased NO_x emissions, and could potentially help to quantify the increase. This

approach could also be used to present data analogous to any other future expected operating scenarios which are not represented in the 2012 Discoverer data.

Please provide the information requested above by April 30, 2013, or notify Natasha Greaves if a complete response is not possible by this date. Your application is considered incomplete until this information is received and evaluated and the EPA has determined that the application contains all of the information needed for the EPA to propose a permit decision. Note that as the EPA continues review of your application, we may identify further information that will be essential to enable the EPA to continue processing your application and make a permit decision, including information that may be needed to respond to public comments.

If you have any questions, please contact Natasha Greaves at 206-553-7079 or greaves.natasha@epa.gov.

Sincerely,



Kate Kelly, Director
Office of Air, Waste, and Toxics

Enclosure

cc Chris Lindsey, Shell
Pauline Ruddy, Shell
Lance Tolson, Shell

Attachment1: NO_x BACT Limits

Context for the NO_x BACT Limits

In pre-application discussions, Shell proposed to base the revised limits on the emissions data collected during 2012 by the EPOD NO_x sensors. The EPA agreed with this approach because in our opinion, the EPOD NO_x sensor data represent the best available information regarding emission unit-specific NO_x emission control and emission rates achievable with the installed control technology. The EPA has consistently maintained that the data used as the basis for the revised limits be data that was not collected during startup, shutdown, or malfunction of the engines or EPODs. This approach is consistent with the EPA permitting practice and common sense; emission limits representing BACT during normal operation cannot be based on data collected during startup, shutdown, or malfunction. It is therefore reasonable to set the limit based on data collected during times when the available information indicates that the engines and EPODs are operating properly. The limits should account for all legitimate emission unit operating scenarios to the extent possible.

Although the setting of emission limits based on measured emissions data is rare, some precedent does exist within the EPA, state and local agency experience. The EPA staff engineer has been conducting an ongoing effort to identify analogous regulatory actions, which provide some context for the revision of the Discoverer main generator engine BACT limits based on actual emissions data. This effort has yet to identify any EPA action where limits were set above the maximum measured value in a dataset considered to represent proper operation of the emission unit and control device.

The most relevant EPA examples identified to date are a group of limits set as part of the resolution of violations for failing to install BACT. In these actions, the EPA established emission limits based on emissions data obtained by continuous emissions monitoring systems (CEMS). After removing data representing startup, shutdown, and malfunction, the EPA calculated rolling actual emissions levels in terms of the averaging period(s) over which limits would be set. The rolling average actual emission levels from the dataset were then ranked, and the emission limits were set at emission rates representing either the 99th or 95th percentile values based on the ordered ranking. For example, if the dataset contained 100 values, short term limits were set at the 99th highest value, and long term limits were set at the 95th highest value. This approach is clearly much more stringent than the EPA's current draft limits for NO_x from FD-1 – FD-6, which include more than a 30% compliance margin above the maximum measured value in the dataset. This example illustrates one factor which contributes to the technical basis for the EPA's proposed 30+% compliance margin; specifically that the data collected by the EPOD NO_x sensors is considered to be less accurate than CEMS data.

The EPA has also examined actions taken by state and local air agencies with respect to the question of compliance margin, particularly those actions which have withstood review by the Environmental Appeals Board (EAB). The largest compliance margin identified to date is 25% used within a permitting action taken by South Coast Air Quality Management District (SCAQMD). In this case, the margin is referred to as a "safety factor," and is applied to account for uncertainty present in applying emissions data from a similar plant to determine a BACT limit for the plant undergoing permitting. This source of uncertainty is not present in the case of

the Discoverer (since the 2012 data is not from another facility), but the example does provide some perspective on the scale of compliance margins which have withstood EAB review.

Additionally, the EPA's engineer has conducted informal interviews with other EPA technical air quality staff across the region, nation, and other EPA programs to gain perspective on the EPA's draft revised limits. These discussions have consistently confirmed that the draft revised limits provide a higher compliance margin than is typical.

Comments on Shell's Proposed NO_x BACT Limits

In the November 2012 permit revision application, Shell proposed across-the-board revised limits of 6 g/kw-hr for units FD-1 – FD-6. Detailed examination of the 2012 emission data collected by the EPOD NO_x sensors in conjunction with other relevant information clearly indicates that this limit was based on data collected when the EPODs were severely impacted by urea crystallization.

In response to Region 10's draft limits, the submittal dated February 13, 2013, proposes limits of 3.7 g/kw-hr with no clear technical basis. Elsewhere in the submittal Shell states that basing the revised limits on the 2012 EPOD sensor data is not reasonable. Given all information currently available, basing the revised NO_x BACT limits on the 2012 EPOD NO_x sensor data is the most reasonable and technically defensible approach.

The following respond to each of the six bullet points in Shell's February 13, 2013 submittal cited as the justifications for the requested 3.7 g/kw-hr limit.

1. The EPA has thoroughly considered the novelty of the application of modern air pollution control technology to the Discoverer's decades' old generator engines, along with all the information Shell has provided regarding the challenges this presents. However, the 2012 season did provide significant data demonstrating the control levels and emission rates achievable for these emission units. The EPA agrees that the original BACT determination requires revision, and the EPA's draft revised limits represent a four to six fold increase over the current BACT limits. Shell asserts that "recent experience" indicates that FD-1 – FD-6 cannot meet limits set more than 30% above the maximum emission rates measured during 2012 when the EPODs were operating normally. It is unclear to the EPA what "recent experience" Shell is referring to.
2. These factors are inherently represented in the 2012 data.
3. The EPA's draft limits are based on the 2012 EPOD sensor data, as discussed during the pre-application stage and as proposed by Shell in the November 2012 application. Although Shell states that the EPA is relying too heavily on these data, this was the agreed upon approach and Shell has not provided an alternative supportable basis. Shell cites the fact that no well was drilled to depth during 2012. The EPA agrees that this represents a gap in the 2012 data, and considers this as justification for the proposed 30+% compliance margin. The EPA will consider any detailed and supportable analysis Shell can provide that explains how drilling holes to depth could potentially result in increased NO_x emissions.
4. Although the engines are all the same model, the sheer age of the engines can reasonably account for highly variable uncontrolled emissions levels. The EPA's draft limits are

based on the actual performance of each engine/EPOD combination. The 2012 data clearly shows that while a reasonable level of consistency exists with respect to controlled emission rates among certain units, some engine/EPOD combinations perform better than others with respect to NO_x emissions. The EPA does not consider it reasonable to apply the most permissive emission limit based on the performance of the worst performing engine/EPOD combination to better performing units.

5. See response to 4.
6. The EPA's analysis results in draft limits between 2.1 and 2.9 g/kw-hr based on the actual 2012 performance of the units. Shell's use of the word "precision" implies that these values reflect multiple measurements of the same parameter, which is not the case. Subtracting the difference between the highest and lowest proposed emission rate as the "precision" is not accurate because these values do not represent repeated measurement of a single parameter under constant conditions, but rather different parameters altogether (different emission units). In other words, these are not a set of measurements of the same physical parameter, but reflect actual performance data from each engine/EPOD combination.

Based on the EPA's analysis¹ identifying the highest 24-hour rolling average emission rate during 2012 which reflects proper engine and EPOD operation, Shell's proposed limit of 3.7 g/kw-hr represents the following compliance margins for each unit:

- FD-1 = 113%
- FD-2 = 69%
- FD-3 = 97%
- FD-4 = 118%
- FD-5 = 113%
- FD-6 = 134%

In summary, Shell has not provided sufficient technical basis for the proposed limit of 3.7 g/kw-hr. Additionally, Shell has provided no reasoning as to how operating scenarios expected to occur in the future, but not reflected in the 2012 data, could result in increased NO_x emissions. Given the overall uncertainty introduced by the fact that the 2012 data does not include all expected operating scenarios, the EPA's analysis assumes the potential for increased emissions due to deep drilling and includes an uncertainty factor given the limitations of the data.

¹ Sent to Shell's consultant via email on February 8, 2012.